

1   **What is claimed is:**

1       1. A method of manufacturing polymeric foam using  
2       supercritical fluids, comprising the steps of:

3       (a) placing a foamable polymeric material in a mold;

4       (b) introducing a supercritical fluid through the mold  
5       at a first temperature and at a first pressure for  
6       a time period sufficient to impregnate the  
7       polymeric material; and

8       (c) changing the first temperature and the first  
9       pressure to a second temperature and a second  
10      pressure sufficient to produce the polymeric foam  
11      having microcells.

1       2. The method as claimed in claim 1, wherein the method  
2      is performed using a compression molding machine.

1       3. The method as claimed in claim 1, wherein the method  
2      is performed using an injection molding machine.

1       4. The method as claimed in claim 1, wherein the  
2      supercritical fluid is a supercritical gas.

1       5. The method as claimed in claim 4, wherein the  
2      supercritical fluid is supercritical carbon dioxide or  
3      supercritical nitrogen.

1       6. The method as claimed in claim 1, wherein the  
2      polymeric material is selected from a group consisting of  
3      thermoplastics, thermoplastic elastomers, partially  
4      crosslinked thermoplastics, partially crosslinked  
5      thermoplastic elastomers, crosslinked thermoplastics,

6 crosslinked thermoplastic elastomers, and the combination  
7 thereof.

1 7. The method as claimed in claim 6, wherein the  
2 polymeric material contains a chemical foaming agent.

1 8. The method as claimed in claim 6, wherein the  
2 polymeric material contains a chemical crosslinking agent.

1 9. The method as claimed in claim 6, wherein a chemical  
2 crosslinking is performed in the mold.

1 10. The method as claimed in claim 6, wherein a physical  
2 crosslinking is performed in the mold.

1 11. The method as claimed in claim 1, wherein the  
2 polymeric material in step (a) is a shaped foamable article.

1 12. The method as claimed in claim 11, wherein the  
2 polymeric material is a particulate-shaped foamable article.

1 13. The method as claimed in claim 11, wherein the  
2 polymeric material is a foamable article in a form of sheet.

1 14. The method as claimed in claim 11, wherein the  
2 polymeric material is a foamable article in a molten state.

1 15. The method as claimed in claim 1, wherein, in step  
2 (a), the mold is fully filled with the polymeric material.

1 16. The method as claimed in claim 1, wherein, in step  
2 (a), the mold is partly filled with the polymeric material.

1 17. The method as claimed in claim 1, wherein the  
2 temperature of the mold is adjustable.

1           18. The method as claimed in claim 1, wherein the  
2 polymeric foam obtained by the method is microcellular foam.

1           19. The method as claimed in claim 1, wherein the  
2 polymeric foam obtained by the method is microcellular  
3 crosslinked foam.